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The difficulty of improving it can be best appreciated by making the trial.

Again, it must be remembered that while there are many thousands of nebulae, there are only comparatively few spiral nebulae, and that the type curve fits a very great percentage of these, while it cannot be tortured into a resemblance to other nebulae not spiral.

If the helix given in Figure 2 is indeed the type of a certain class of nebulae, many interesting questions may receive a solution. For example, what are the directions in space of the *axes* of these different nebulae? Is there anything systematic in these directions? What is the law of the force by which particles of matter are expelled from (or attracted to?) the central nucleus? Have we here in the nebulae different types of spirals somewhat analogous to the different types of comets' tails so ably discussed by Professor BREDICHIN?

Some of the parts of these nebulae must be approaching the earth, some receding from it. Can we by the spectroscope discriminate between such motions?

A suggestion which holds out even the hope of successfully attacking such problems is not without its value, and I have, therefore, no hesitation in presenting the foregoing paper in its present incomplete form.

EDWARD S. HOLDEN.

LICK OBSERVATORY, July 12, 1889.

# ON THE ORBIT OF COMET BARNARD (1889, JUNE 23).

BY A. O. LEUSCHNER.

From Mr. BARNARD's observations of June 23, 24, 25, I have deduced the following elements:

$$T = 1889, \text{ June } 20.1480 \text{ G. m. t.}$$

$$\left. \begin{array}{l} \Omega = 271^{\circ} 4'.1 \\ \omega = 59^{\circ} 20'.7 \\ i = 31^{\circ} 14'.6 \end{array} \right\} 1889.0$$

$$\log q = 0.04236$$

$$\text{Obsd.} - \text{Computed; } \Delta \lambda \cos \beta = -0'.3, \Delta \beta = 0'.0.$$